

Identifying and Addressing Land Surface Model Deficiencies with Data Assimilation

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Land surface models (LSMs) encapsulate our understanding of terrestrial water and energy cycle physics and provide estimates of land surface states and fluxes when and where measurement gaps exist. Gaps in our understanding of the physics are a different issue. Data assimilation can address that issue both directly, through updating of prognostic model variables, or indirectly, when the simulated world conflicts with observation, necessitating adjustment of the model. Here we will focus on the latter case and present several examples, including (1) depth to bedrock adjustment to accommodate assimilated GRACE terrestrial water storage data; (2) steps to prevent immediate melting of assimilated snow cover; (3) irrigation's contribution to evapotranspiration; (4) lessons learned from soil moisture data assimilation; (5) the potential impact of satellite based runoff observation.